Supporting Technical Data

Following are some data points and information from WSDOT policies and guidance documents, as well as from prior email correspondence and research, regarding speed limits and retaining wall engineering.

While retaining wall design is primarily driven by engineering, there is an opportunity to influence its design through alternate engineering methods and by reducing the speed on State Highway 522.

Reducing the speed can allow 10' wide through traffic lanes. With 4 through traffic lanes, the overall road width can be reduced by 4'. If this reduction is taken solely on the west side the retaining wall will need to hold back the hill at a lower elevation.

Specific data points from the 90% documents:

a. Wall 20146 – S64: narrow by 4'-0" = ~3.5' lower wall
b. Wall 20146 – S129: narrow by 4' = ~5.75' lower wall
c. Average wall height reduction appears to be about 3'

Retaining walls have been shown to provide both acoustic benefits and acoustic challenges to the neighboring homes. While the data is limited to show how reflected noise, being concentrated by a concave wall that is constructed of thick, hard materials will adversely impact the neighboring homes, it is possible and no data has been shown that rules out this specific scenario. If an acoustic nuisance is a result of the current design, there is little to nothing that can be done after it is constructed.

Alternate construction method to reflect sound upward over the homes to the east

a. Lower wall may be able to be constructed using an alternate structural method that allows a tilted wall to provide some acoustic benefit by directing the sound upward, rather than reflecting back to the homes on the east side of the highway
b. A soil nail retaining wall at an angle will tilt the concrete panels to assist in directing reflected noise
c. A sloped concrete block retaining wall is possible, even one with planting pockets, that will both diffract sound and provide some absorptive elements as well

The Council is asking for a reduced speed limit. This reduction is supported by WSDOT policies as follows:

a. Per 1231-1 of the WSDOT Design Manual M 22-01.21
    i. Low Speed Highways may have a lane width of 10'-12'
    ii. "Narrower lanes may be used as part of a speed reduction strategy"
    iii. "On multilane facilities with width constraints, utilizing narrower inside lanes may permit wider outside lanes for bicycles, freight, and transit."
    iv. "Reduced lane widths allow more lanes to be provided in areas with constraints and allow shorter pedestrian crossing times because of reduced crossing distances."

v. “Lane widths of 10 ft may be appropriate in constrained areas with low truck and bus volume in pedestrian oriented sections, 10 ft lanes can be beneficial in minimizing crossing distance”

It is clear that the stretch of 522 through LFP could benefit from the narrower lanes to reduce speeds as the speed study showed vehicles traveling over 45 at the 80% level. This means there are vehicles traveling 48, 50, 55MPH. This is far for the intended use of the highway and far from safe. This stretch has significant width constraints as both sides of the highway require a multitude of acquisitions to configure the lanes at the 11’ width. Sound transit is building several Stride bus stops along this stretch of 522 which will increase pedestrian crossings and 10’ lanes should be utilized to reduce crossing times and distance.

The speed study from early 2023 evaluated this stretch of 522 as-is while it will have a configuration similar to that in Kenmore when the Sound Transit project is complete. Then it is likely to be revised to 35MPH to match that of Kenmore. Now is the time to reevaluate this stretch in it revised configuration such that ST can design their lane widths to match the final speed WSDOT is likely to assign to this stretch once they are complete. A temporary speed reduction is likely to ensure the site is safe during the construction phase and reverting to a higher speed afterwards is not necessary.

Feedback from WSDOT was that Kenmore received a lowering of their speed limit due to the lane configuration and the high activity from commercial access driveways. After Sound Transit LFP will have:

d. very similar lane configuration when the ST project is complete
e. similar commercial access needs for the south portion of 522

A major deviation from the Kenmore stretch of 522 is that LFP has several single family residential homes that cannot utilize a pass through driveway and will need to back dangerously into or out of their driveways into the BAT lane with challenging sight lines due to the lower level of the homes. This is unsafe and is not consistent with LFP’s goals as a King County Target Zero Task Force partner.

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